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DRABA ON CLAY BUTTE, WYOMING

REED C. ROLLINS

HARDLY more than half a mile from Beartooth Butte, noted for the deposition there of Lower Devonian fossil plants (Dorf, 1933), is Clay Butte. These Buttes (really "flat-topped" mountains) situated in the extreme northwestern corner of Park County, Wyoming, and not far east of Yellowstone Park, are made up of a variety of clays, basic shales, and rocks somewhat in contrast to many of the primarily granitic mountains of the surrounding area. Clay Butte, as Professor C. L. Porter of the University of Wyoming and I were to discover, is a real mecca for anyone interested in the genus *Draba*. In two days of botanizing on this 10,300-foot mountain in early August, 1951, we covered the varied habitats of the broad approaches to the highest part of the Butte and collected fifteen numbers of *Draba* representing eleven different species. Later in the month Professor Porter made several additional collections from more northerly stations on the Butte. Some of these latter collections are mentioned below in addition to those made earlier. Not only was there an unusually large number of species on Clay Butte, but in most instances there were thousands or hundreds of thousands of individuals of each species. *Draba* was found in a wide range of habitats, including such extremes as rock chimneys, steep clay slopes, and nearly bare "snowdrift-melt" areas. An exceedingly wide range of variation is demonstrated by the samples of several populations of *D. incerta*, and others of the collections made are of special interest. Some problems have arisen in connection with the identity of the specimens taken, and it is my present purpose to deal with these and to mention specifically the nature of the variation encountered. The material collected was ample for most of

the numbers, there being an abundance of plants at nearly every location.

DRABA OLIGOSPERMA Hook. Three collections are referable to this species which grows in exposed situations. *Rollins & Porter 51273* was collected on a ridge-top and the plants were of the "pincushion" type with densely congested leaves and short scapes, 1-3 cm. long. The siliques in this collection are nearly orbicular in outline, though tapered above, and range from being well-covered with simple recurved trichomes to nearly glabrous. *Rollins & Porter 51270* came from a slightly less exposed situation and the plants were less compact. They formed mats up to six inches in diameter and the scapes varied from 3 to 6 cm. high. The silique-shape among these plants varies from nearly orbicular in outline to slightly longer than broad and they are densely to sparsely covered with simple recurved trichomes. Three plants of this collection with more elongate fruits, pubescent pedicels and branched trichomes upon the fruits are of special interest and are discussed below. A third collection made by Porter (no. 5884) is quite similar to no. 51270, and a fourth, from nearby Beartooth Butte, made in 1939, *Rollins & Muñoz 2840*, is very similar to no. 51273.

Down the slope from the ridge-top where *D. oligosperma* was found were plants of a closely related species collected as no. 51269. These have elongated siliques that are rounded above, tapered below and covered with "doubly pectinate" appressed trichomes on the valve surfaces. The shape differs markedly from the broad fruits of *D. oligosperma* which are rounded below, tapered above, and covered with simple recurved trichomes. Also, the longer pedicels and scapes are pubescent instead of glabrous, as in *D. oligosperma*, and the petals are white instead of yellow. Though closely related to the latter species, there is a pattern of distinctive characteristics that shows these plants are not the same. Below, the plants are described as *D. pectinipila*.

This new species is in contact with *D. oligosperma* and there is evidence that some hybridization occurs. This evidence comes from three plants collected near the point of contact on Clay Butte where nos. 51269 and 51270 were taken. One of the three shows a mixture of simple and branched trichomes on the valve surfaces, with considerable variation from one silique to another.

Also, the siliques are broader and less elongated than is characteristic of *D. pectinipila*. The other two plants are more compact than is usual for *D. pectinipila*, but this is not surprising since they were growing in a more exposed situation. One of the two has nearly glabrous pedicels but they are otherwise much alike and fit *D. pectinipila* very well. These three plants have been placed in the Gray Herbarium under no. 51270a.

Draba pectinipila Rollins, sp. nov.

Deep-rooted soboliferous perennial; caespitose, clumps 2–4 inches across; caudex loosely matted, highly branched; leaves tufted, terminating the caudex branches, linear to narrowly linear-oblongate, 5–12 mm. long, 0.75–1.5 mm. wide, densely pubescent with appressed branched trichomes, these with a central axis and simple or forked branches on each side (doubly pectinate), ciliate with much larger, simple or rarely forked trichomes along the petiole margins; cauline leaves lacking; scapes 3–10 cm. long, slender, pubescent throughout with “doubly pectinate” trichomes; infructescence elongated, often occupying up to three-fourths of the scape-length; pedicels slender, divaricately ascending, straight to slightly curved upward, pubescent, 5–10 mm. long, expanded at summit; sepals tending to be persistent, sparsely pubescent, hyaline-margined, broadly oblong to elliptical, 2.5–3 mm. long, ca. 1.5 mm. wide; petals white, spatulate, 4–5 mm. long; filaments broad, markedly dilated below; siliques oblong, rounded above and tapered below, 5–8 mm. long, 2–3 mm. broad, flattened parallel to replum, pubescent on valve surfaces with appressed “doubly pectinate” trichomes, pubescent on the margins with forked or simple recurved trichomes; styles uniform in diameter from base to apex, 0.5–0.75 mm. long, stigma discoid, slightly greater in diameter than style; seeds 3–5 in each loculus, wingless, oblong, ca. 1.5 mm. long, 1 mm. wide.

Herba perennis caespitosa sobolifera; caulibus tenuibus erectis pubescentibus 3–10 cm. longis; foliis linearibus vel lineari-oblongatis dense pubescentibus 5–12 mm. longis, 0.75–1.5 mm. latis; pedicellis tenuibus divaricatis pubescentibus 5–10 mm. longis; petalis albis spatulatis 4–5 mm. longis; siliquis oblongis pubescentibus 5–8 mm. longis, 2–3 mm. latis; stylis 0.5–0.75 mm. longis; seminibus oblongis emarginatis ca. 1.5 mm. longis.

Type in the Gray Herbarium, collected on a rocky exposed slope in heavy clay soil, Clay Butte, one-half mile west of Beartooth Butte, northwestern Park County, Wyoming, August 1, 1951, *Reed C. Rollins & C. L. Porter 51269*. Other specimens seen: dry hillsides, vicinity of Flaming Gorge, Daggett Co., Utah, June 1, 1932, *L. Williams 476* (GH); same locality, 15 miles southeast of Manila, June 3, 1938, *Reed C. Rollins 2275* (GH).

The Utah specimens cited are very similar to the northern Wyoming material in most respects, but differ in having a slightly

coarser pubescence and siliques that are tapered both above and below.

The evidence that *D. oligosperma* and *D. pectinipila* hybridize would be used by some botanists as a basis for including both types within the same species. However, the fact that both maintain themselves in the area where they are in contact is very good evidence that there are genetic barriers of some kind preventing the formation of a single panmictic population. Furthermore, it seems to me that the existence of two populations separated by nearly four hundred miles, yet fitting neatly into the same morphological pattern, is evidence that we are dealing with an old and well established species, not populations of recent hybrid origin. The northeastern Utah-northwestern Wyoming jump may seem unusual, but this distribution is nearly paralleled by *Draba apiculata* and also by such an unusual crucifer in its Rocky Mountain distribution as *Parrya nudicaulis*, to mention only two examples from the Cruciferae alone. Of course it is quite possible that intermediate stations of *D. pectinipila* will be found as further explorations are carried out.

DRABA INCERTA PAYSON. The five collections from the Bear-tooth Butte area, referable to this species, show an extremely wide range of variation. In fact, the limits equal or exceed that shown by the other forty specimens of *D. incerta* in the Gray Herbarium from the whole geographical range of the species. *Rollins & Porter 51276* was collected in the clay soil of rock crevices on a steep slope. The plants were loosely tufted, usually with numerous stems and with linear-lanceolate leaves. On the specimens collected, the siliques are narrow, elongated and pubescent. In contrast, the plants of *Porter 5904*, from near Island Lake in the same general area, have broad pods and much broader leaves. *Rollins & Porter 51271* is a glabrous fruited collection, the fruits being much the same size and shape of the type collection of *D. incerta*. While the plants of this collection were definitely caespitose, the tufts rarely exceeded 2 inches in diameter. However, plants of a mixed glabrous and pubescent fruited collection, *Rollins & Porter 51277*, grew in clumps up to six inches in diameter with numerous stems. The siliques of the latter are narrower and more elongated than most collections of *D. incerta*, being somewhat like no. 51276 in that respect. A col-

lection made in 1939 from Beartooth Butte, *Rollins & Muñoz 2843*, is similar to the type collection, and this includes the nature of the pubescence of the fruits.

In seeking for the basis of the rather wide quantitative and qualitative differences characterizing the collections mentioned, attempts were made to count the chromosomes in those collections where seed was available. Considerable favorable material of *Porter 5904* was obtained and, after hours of study of many figures, the number $2n = ca. 100$ was arrived at.¹ Although an absolute count could not be established, it is at least known that high polyploidy is one of the contributing factors to the wide variation found.

DRABA APICULATA C. L. Hitchc. Plants of this species are caespitose, occurring in tufts up to two inches in diameter. The numerous scapes are relatively stout, as are the divaricate pedicels. It was collected in fruit as *Rollins & Porter 51272* on August 1, and later on August 17 picked up in flower by Porter (no. 5893) on the north end of Clay Butte. With Carlos Muñoz (no. 2839) I collected this species on Beartooth Butte in 1939. These collections are from the northernmost known stations for the species. As noted above, it ranges southward in the high mountains of western Wyoming to the Uinta Mountains of northeastern Utah. Our collecting sites on Clay and Beartooth Buttes are so close to the Montana border that *D. apiculata* is almost certain to be found in that state.

DRABA PAYSONII Macbride. Some of the plants of this species growing on a steep rocky slope were definitely woody at the base and most of them occurred in loose soil that showed evidence of seasonal shifting. The specimens taken have a very deep root system with an extensive and successively branched caudex. Collected on the south slope of one of the upper ridges, *Rollins & Porter 51275*.

***Draba nivalis* Lilj., var. *brevicula* Rollins, var. nov.**

Perennial, caespitose, caudex usually branched; leaves tufted, terminating the caudex branches, broadly oblanceolate, obtuse, 4–10 mm. long, 1.5–2.5 mm. wide, only slightly narrowed to the petiole, midvein evident below, not detectable above, densely covered with dendritic trichomes, not pannose; ciliate along petiolar area; scapes 1 to 10, slender, pubescent

¹ I am indebted to Dr. L. O. Gaiser for making the two chromosome determinations reported in this paper.

below to sparsely so above, 2–6 cm. high; infructescence with 2 to 10 siliques often grouped toward the apex of the scape; pedicels ascending to divaricately ascending at an angle of ca. 45° from the rachis, glabrous, 0.5–2 mm. long, lower one or two pedicels with a leaf-like bract; bract entire, sessile, glabrous or with a few simple trichomes; sepals persistent, falling off only when fully matured siliques have been developed, white to yellowish white, oblong, ca. 1.5 mm. long, with a few long simple or forked trichomes on the back; petals white, spatulate, with a slender claw markedly emarginate, 2–3 mm. long; filaments dilated at base, whitish, anthers oval; siliques narrowly elliptical to ovate, glabrous, flattened parallel to septum, plain, not nerved, 4 to 8 mm. long, 1.5–2.5 mm. wide; style very short, less than 0.2 mm. long, stigma unexpandable; ovules 4–7 in each loculus.

Herba perennis; foliis oblanceolatis obtusis 4–10 mm. longis, 1.5–2.5 mm. latis; scapis tenuibus pubescentibus; pedicellis divaricatis 0.5–2 mm. longis; siliquis ellipticis vel ovatis glabris 4–8 mm. longis, 1.5–2.5 mm. latis.

Type in the Gray Herbarium, collected in crevices of vertical cliffs on the western edge of Clay Butte, August 2, 1951, *Reed C. Rollins & C. L. Porter 51278*. This same variety was collected on Beartooth Butte by *Louis O. Williams & Rua P. Williams 3649* in a mixture with *D. lonchocarpa* (GH).

Variety *brevicula* differs from *D. nivalis* proper in having short glabrous instead of much longer pubescent pedicels, broader siliques, fewer seeds and much larger basal leaves which lack the characteristic pannose pubescence of var. *nivalis*. Our plants are so different from the other Rocky Mountain varieties of *D. nivalis* that they at first appeared to represent a totally new species. However, once *D. nivalis* var. *elongata* was seen to represent a distinct species (*D. lonchocarpa*), as indicated below, it became easier to see the relationships. Variety *brevicula* appears to be closest to Newfoundland material of *D. nivalis*, but its relatedness to *D. nivalis*, var. *exigua* can also be seen.

DRABA LONCHOCARPA RYDB. Two collections of this species were taken, one in the open (*Rollins & Porter, 51279*) and the other from the shady crevices of cliffs (*Rollins & Porter, 51280*). An additional collection from the north end of Clay Butte, *Porter 5883*, has a chromosome number of $2n = 16$. Two collections from nearby Beartooth Butte are *Louis O. Williams & Rua P. Williams, 3649* in part (GH), and *Rollins & Muñoz, 2844* (GH).

For some time I have followed Dr. C. L. Hitchcock (1941) in treating this taxon as *D. nivalis* Lilj., var. *elongata* Wats. How-

ever, in studying the material of *D. nivalis*, I found that in addition to the other recognized characters that distinguish it from *D. lonchocarpa*, the funiculi are very short whereas in *D. lonchocarpa* the funiculi are very long and slender, equalling or exceeding the seeds in length. This is a fundamental difference that remains relatively constant and can be readily utilized to recognize even the shorter podded forms of *D. lonchocarpa*. I am convinced that these plants should be recognized on the species level. It is quite interesting that the long slender funiculus is also present in *D. nivalis*, var. *Thompsonii* as would be expected on other grounds. To bring the nomenclature into line, var. *Thompsonii* is transferred to *D. lonchocarpa* as follows:

DRABA LONCHOCARPA Rydb., var. **Thompsonii** (C. L. Hitchc.) comb. nov. Based upon *D. nivalis* Lilj., var. *Thompsonii* C. L. Hitchcock, Univ. Wash. Publ. Biol. 11: 85. 1941.

DRABA AUREA Vahl. Specimens were found on the grassy ridge-top of Clay Butte, *Rollins & Porter, 51260*.

DRABA LANCEOLATA Royle. Grassy ridge-top, Clay Butte, *Rollins & Porter, 51258*.

DRABA CRASSIFOLIA R. Graham. Hillside on bare soil of "snowdrift melt," *Rollins & Porter, 51261*. Also obtained on clay slopes near the north end of Clay Butte on August 17th, *Porter, 5890*.

DRABA STENOLOBA Ledeb. Grassy ridge-top, Clay Butte, *Rollins & Porter, 51259*.

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